Picometer Measurements of Interferometric White-Light Fringes

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Abstract

High-precision (50 pm) measurement of broad-band fringes is a key factor in the ability of space-based interferometers to detect extra-solar earth-like planets. In our application, fringes are measured by modulating the optical path while monitoring the modulation amplitude with a laser metrology system having sub-50 pm resolution. The white-light fringe is dispersed over 4 to 40 pixels while the path is binned into 4 to 70 steps. We report both analytical and experimental results showing the sensitivity of the measurement to optical path linearity and scale errors, wavelength and OPD bin size, and source amplitude and wavelength stability.